Synopsis

(Short resume)

"Design, Synthesis and Enzyme Inhibitor Activity of some Transition Metal Complexes"

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In Chemistry

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SYNOPSIS

INTRODUCTION

Origin of the research problem:

A large number of naturally occurring compounds and most of the biological important compound and synthetic drugs possesses nitrogen, oxygen and sulphur hetero atomic moiety in their functional groups. This hetero atomic moiety has tendencies to form complex compounds with biologically important metal ions. Generally most of the biological important compound and drugs initially or after metabolic changes in the body, act as strong chelating ligands to form stable five or six member chelate rings. Literature survey support that the medicinal properties of many chelating agent is related to their ability to form stable metal chelate rings. It has been observed that in most of the cases metal complexes of medicinal ligands are more potent than the parent ligand. In view of this the metal chelating tendencies of various antibacterial, antimaleriais, antileprotic drugs and biological important compound have been studied by a number of researchers. It is now believed that different trace elements serve many critical roles in the living body at a .molecular level. The vital role of inorganic constituents in biological system has been understood at least to some extent, through this area has not explored. much and therefore this is the origin of the researcher problem.

Interdisciplinary relevance :

Metal ligand complexes play an important role in toxicology, medicinal

chemistry, analytical chemistry, environmental science and various other fields. Metal ligand complexes are extensively used in the treatment of cancer. Cisplatin is being used as anticancer.

Although chemotherapy has made significant contributions to cancer treatment, the effect of cisplatin on testicular cancer being a show case example, early detection and surgical removal of all neoplastic tissue

still remain the preferred means of combating most forms of the disease the biochemical mechanism that underlie the transformation of normal into neoplastic cells and to attack the disease on the basis of that knowledge. We known cisplatin is a simple third-row transition metal complex containing no carbon atoms, can contribute significantly to cancer chemotherapy. This is important to search inorganic drugs based on the evolving knowledge of the mechanism of action of cisplatin. .

To explain the strategies for drug development we must have to consider molecular mechanism of drug, what properties are desirable in the design of - new metal complexes for testing. The molecule should be reasonably stable kinetically soluble in biological fluid, cross the cell membrane, bind covalently to DNA and inhibit gene function.

Most of the drugs and biological important compound used clinically have been developed through trial and error experiments there are only few cases where the drug action can be rationalized in the light of thermodynamic and kinetic aspect of the drugs and biological important compound. In the development of potential, antibacterial and antiviral agents, bio inorganic chemists can contribute appreciably along with other traditional experts. Many organic and natural products are being used clinically for a long time, show the drug action of through the complexation with available bio molecules in vivo. The action of drugs to remove toxic metal ions from bodies streams out form the coordination behavior. The effectiveness of any molecule as drug depends on its coordinating behavior at the body temperature and extra cellular fluid pH condition. The coordination behavior of drugs with metal ions in presence of other competing ligands which are biologically importance can be examined in vitro. Synthesize the complexes & check their biological activity. It is with this view in mind; the present work is therefore undertaken to study.

Review of research and development in the subject:

The class of coordination compound is one of the most important · phenomenons in inorganic chemistry. Many coordination compounds

such as chlorophyll and hemoglobin have great important in living organism. The

fundamental and classical investigations in coordination chemistry were carried out by Alfred Warner1 etal. The explosion in this filed was initiated by several researchers.

Metal ions are required for many critical functions in humans. Deficiency of some metal ions can lead to disease. For example pernicious anemia results from iron deficiency, growth retardation arising from insufficient dietary Zinc & heart disease in infants owing to copper deficiency. The ability to organize, to understand at the molecular level & to treat disease caused by inadequate metal ion function constitutes an important aspect of medicinal bioinorganic chemistry

Two important drugs based on metals Cis-platin & auronofin are widely used for the treatment of genitourinary and head & neck tumors and

rheumatoid arthritis respectively. Radioactive metal ions such as technetium and Gadolinium (III) are used as imaging agent for the diagnosis of disease.

First four main group and first transition series metals are currently known to be required for normal biological functions in humana. Anemia results from insufficient oxygen supply, often because of decrease in hemoglobin (Hb) blood levels. This explains the relation between the anemia & iron3. Zinc deficiency produces growth retardation, testicular atrophy, skin lesions, poor appetite & loss of body hair4-6. My interest improved towards the copper because more copper is found in the brain & heart than any other tissue except for linear, where it is stored as copper thionein and released as ceruplasmin or in the form of complex with serurn albumin. The high metabolic ratc of the heart and brain required large amount of copper metalloenzyme including tyrosine, cytochrome-c oxidase, dopamine-B-hydroxylase, pyridoxal requinna monaminc oxidasae & Cu-Zn superoxide dismutase. Copper deficiency, which can occur for

reason analogous to iron & zinc, lead to brain disease in infants, anemia & heart disease.

The complexes of these transition series elements with a variety of ligands have been studied recently by different worker.

Significance of the study :

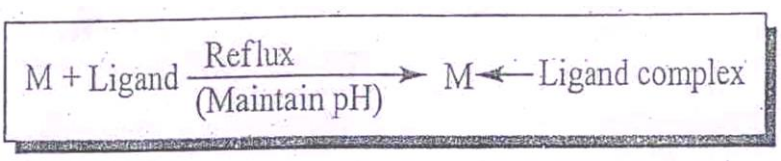
The present trends of research are to protect the life and preserve the

health of human kind. In recent year a number of complexes have gained considerable importance mainly because of the fact that such compounds are structurally related to the active chemical constituent of several traditional medicinal plants. Most of the metal complexes possess interesting bio-chemical properties such as Antitumor, antioxidant, antifungal and antimicrobial activities8-16. Therefore, synthesis and characterization of such complexes have tremendous importance. The present work deals with the studies of metal complexes of drugs & biological importance ligands. So as to confirm whether there is enhancement in the biological activity due to complexation with transition metal ions.

Objectives

The aim and objective of the proposed work is to synthesize the complexes of transition metal and drugs, characterized and study the biological activity. If compound is biological active firstly, we need to find compound that are active against resistant cells. Secondly there is needed to be an improved spectrum of activity. Finally check the toxicity. The prospect is reasonably good that of new complex can be designed in a bioinorganic chemical approach to the problem.

Methodology:



All the synthesized complexes of transition metal and drug characterized by following ways.

1) Physical characterization, analytical and molar conductance.

2) I.R., U.V. and Mass Spectra.

3) Magnetic and electronic absorption spectra.

4) Thermal analysis.

5) Powder X-ray diffraction.

6) Biological aspects.

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Research Guide

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